Kennecott State Permit Limits, Surface Water Standards and Expected Value

The table (below) is arranged in three major sections: MDNRE Groundwater Discharge Permit Limits, Reference V
Values. All values are µg/L except as noted (e.g., pH and radionuclides).

The MDNRE Permit has two sets of limits (points of compliance): Compliance Point 1 is the effluent from the on-
plant (EQ-1 on facility maps) and Compliance Point 2 is the set of downgradient groundwater monitoring wells ide
(approximately 150 downgradient from the edge of the Treated Water Infiltration System). Some parameters for C
explicit limits in the permit, but if there are no limits specified in the permit, the "default" limit is the Part 201 conc
Condition 9(d). These values are shown in square brackets. If any concentration exceeds the Part 201 standards, t
subject to remediation requirements.

Reference Values are MCLs for parameters which have MCLs, Lifetime Health Advisories (LHA), Action Levels
Secondary Drinking Water Regulation (in parentheses). The Michigan Part 201 limits and two values for Michiga
standards are also shown. For some parameters, the surface water standard is a function of the hardness of the wat
shown, the first is for hardness = 30 mg/L, the second (in parentheses) is for hardness = 50 mg/L. (The average of
measurements in the Salmon Trout River watershed in STORET is 61 mg/L.)

The Expected Values are taken from Attachment 1 in the Michigan Groundwater Discharge Permit ("Expected Eff
the Kennecott permit application or state rounding. For some analytes, exceedance of expected value by a factor o
of the state. **Bolded** numbers are potential issues for surface water standards.

Analytes in italics are not in the Michigan Groundwater Discharge Permit and are suggestions based on the Enviro
and #4) identified in the Environmental Concerns and Options for Resolution paper dated 7/7/10.

	Permit Limits		Reference Values			Ex
Parameter	Comp. Pt. 1	Comp. Pt. 2	MCL (Secondary)	Part 201	SW	1 X
Aluminum			(50-200)	50	NA	1.9
Antimony		5.0	6	6	1.7	1
Arsenic	10/6	6.0	10	10	50	1.66
Barium		1,000	2,000	2,000	120 (210)	1.4
Berylium		3	4	4	0.11 (0.41)	0.05
Boron	250	285	5,000 LHA	500	1900	173.6
Cadmium	5/3	3.0	5	5.0	0.92 (1.3)	0.58
Calcium					NA	25.53
Chloride		250,000	(250,000)	250,000	125,000	44,000

Chromium		52	100	100	28 (42)	0.5
Cobalt		23		40	100	0.2
Copper	21/10	10	AL = 1,300 (1,000)	1,000	3.2 (5)	**7.22**
Fluoride		[2000]	4,000 (2,000)		2,700	41
Iron		[300]	(300)	300	NA	3.2
Lead		3.0	AL = 15	4	2.7 (4.8)	0.5
Lithium		88		170	96	4.2
Magnesium				400,000	NA	16.67
Manganese		50	300 LHA (50)	50	670 (1,000)	2.4
Mercury	0.0021		2	2.0	0.0013	**0.00205**
Molybdenum		22	40 LHA	73	120	1.1
Nickel		57	100 LHA	100	29	4.9
N ammonia		10,000	30,000 LHA	10,000	29	**2,328**
N nitrate		10,000	10,000	10,000	10,000	30
N nitrite			1,000			
pH		6.5 – 9.0			6.5 – 9.0	
Phosphorus				63,000	1,000	0.8
Potassium					NA	1,200
Selenium	25/5	5.0	50	50	5	1.27
Silver	17/0.4	0.4	100 LHA (100)	34	0.06	**0.2**
Sodium		120,000	60,000 LHA	120,000	NA	30,000
Strontium		2,300	4,000 LHA	4,600	2,300	95
Sulfate		250,000	250,000 (250,000)	250,000	NA	1,700
Thallium		1.0	2	2	1.2	0.4
Vanadium		2.2		4.5	12	0.3
Zinc		1,200	2,000 LHA (5,000)	2,400	43 (66)	18
BOD	report					
Total Dissolved Solids (mg/l)º			(500)			
alpha particles						
beta particles and photon emitters			4 millirems/ year			
Radium			5 pCi/l			

Uranium			30			
Benzene			5			
Toluene			1,000			
Xylenes (total)			10,000			